

# Animal Science 3443

## Genetics of Livestock



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Office: Vincent (VIN) 227

**Office Hours:** If the door is open, come on in. If not, then please email me to set up an appointment, and/or state your question, comment, or concern.

## Course Information

### Course Description

Application of genetic principles and concepts to livestock breeding. Consideration of breeding objectives, breed characteristics, pedigree relationship, inbreeding, gene (allele) frequency, detection of heterozygotes, use of pedigree and progeny information for selection, hybrid vigor, crossbreeding, genotype-environment interactions, selection criteria, heritability, direct and correlated response to selection, and genetic evaluation and prediction.

### Prerequisites

Some foundational bit of understanding, and a strong interest in the application of genetic principles to livestock breeding, with the use of some basic statistics concepts. Some prior course(s) in, or at least some amount of experience in animal breeding, and fundamental statistics would be a great booster to the student's learning experience in this course, but is not necessary, or required upon taking this course.

### Student Learning Outcomes

Upon completion of this course, students will be able to better and more clearly understand concepts associated with genetics, in the context of livestock breeding. They will be able to apply these concepts to the better production of both purebred and commercial livestock, upon regularly attending, and fully engaging in this course.

### Course Delivery

This is a face-to-face course with online components such as announcements, assignments, and possible supplementary material that students are expected to access in [Blackboard](#).<sup>1</sup>

## Recommended Text

Understanding Animal Breeding, by Richard M. Bourdon. (Optional)

## Technology Requirements

To successfully complete this course, students need to be able to get onto Blackboard to check for announcements, and view/download/complete/submit assignments, as they are given.

## Communication

Email: [jlangdon@angelo.edu](mailto:jlangdon@angelo.edu)

Office Phone: 325-486-6925

Office Room #: Vincent (VIN) 227 (email, or talk with me to set up an appointment)

Blackboard: View for announcements, and for assignments.

## Grading

### Evaluation and Grades

EXAMINATIONS: I – Tentatively, Oct. 7  
II – Tentatively, Nov. 4  
III – Tentatively, Dec. 2  
IV – Final; Tentatively, Dec. 7

GRADES: Lab = 1 / 4  
I = 1 / 6  
II = 1 / 6  
III = 1 / 6  
IV = 1 / 4

‡ The final exam (IV) will be optional for students with no unauthorized absences, who turn in all assignments on time (a reasonable amount of extra time will be granted if the assignment is late coming in, due to an authorized absence). Students with two or less unauthorized absences will be eligible for a curve in the course. So, upon opting out of the final, lab then becomes 1/3, and your lecture exam average is then 2/3 of your final grade for the course.

## **Grading System**

Course grades will depend on completing course requirements and meeting the student learning outcomes.

This course uses the following grading scale:

A = 90.00-100 points

B = 80.00-89.99 points

C = 70.00-79.99 points

D = 60.00-69.99 points

F = 0-59.99 points (Grades are not rounded up)

## **Assignment and Activity Descriptions**

Planning on 9 homework assignments, 4 in-class assignments, 3 exams, and an optional final exam—the final exam being contingent upon the student's course average and their attendance status (see “Evaluation and Grades” ¶ above, for more detail)

## LECTURE OUTLINE

- I. Introduction (1)
  - a. Basis for grading
  - b. Establishing objectives
  - c. Types of characters
  - d. Principles of animal breeding
- II. Structure of the livestock breeding industry (1)
- III. Genetic Relationship (4)
  - a. Measures of relationship and inbreeding
  - b. Effects of inbreeding on relationship
  - c. Variability in genetic similarity among relatives
- IV. Selection for quantitatively inherited traits (4)
  - a. Gene frequency and selecting against recessive genes
  - b. Detecting heterozygotes for recessives
  - c. Parental determination and verification
  - d. The use of markers and/or molecular probes
- V. Breeding systems and the utilization of breeds (6)
  - a. Commercial straightbreeding
  - b. Crossbreeding systems, including composites
  - c. Seedstock breeding programs
- VI. Selection for quantitatively inherited traits (5)
  - a. Genotype-environment interactions
  - b. Selection criteria
  - c. Transmitting ability and heritability
  - d. Factors affecting selection response
  - e. Correlated traits
  - f. Selection for female productivity and efficiency
  - g. Monitoring unwanted correlated response
- VII. Linebreeding (1, the last lecture of the semester)

## LAB OUTLINE

- I. Breeds (1)
- II. Genetic relationship (2)
- III. Hog color inheritance (1)
- IV. Genetic abnormalities and progeny testing for recessive genes (1)
  - a. Probability of detecting a heterozygote
  - b. Probability of being homozygous dominant
- V. Horse color inheritance (1)
- VI. Performance of crossbreds (2)
- VII. Relationship covariance averaging (1)
- VIII. Cattle color inheritance (1)
- IX. Genetic prediction for quantitatively inherited traits (2)
  - a. Information used in genetic predictions
  - b. Expectations in the progeny due to genetics
    - i. Means
    - ii. Variability
  - c. Precision (standard error) and accuracy of genetic prediction
- X. Miscellaneous (1)
  - a. Across breed genetic predictions
  - b. Horns in sheep
  - c. Horns in cattle
  - d. Inheritance of the Callipyge condition in sheep

## General Policies Related to This Course

All students are required to follow the policies and procedures presented in these documents:

- [Angelo State University Student Handbook](#)<sup>2</sup>
- [Angelo State University Catalog](#)<sup>3</sup>

### Academic Integrity

Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU.

The College of Science and Engineering adheres to the university's [Statement of Academic Integrity](#).<sup>4</sup>

### Accommodations for Students with Disabilities

ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAAA) and subsequent legislation.

Student Disability Services is located in the Office of Student Affairs, and is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability. It is the student's responsibility to initiate such a request by contacting an employee of the Office of Student Affairs, in the Houston Harte University Center, Room 112, or contacting the department via email at [ADA@angelo.edu](mailto:ADA@angelo.edu). For more information about the application process and requirements, visit the [Student Disability Services website](#).<sup>5</sup> The employee charged with the responsibility of reviewing and authorizing accommodation requests is:

Dr. Dallas Swafford  
Director of Student Disability Services  
Office of Student Affairs  
325-942-2047  
[dallas.swafford@angelo.edu](mailto:dallas.swafford@angelo.edu)  
Houston Harte University Center, Room 112

### Incomplete Grade Policy

It is policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have serious illness or a personal misfortune that would keep you from completing course work. Documentation may be required. See ASU Operating Policy 10.11 [Grading Procedures](#)<sup>6</sup> for more information.

### Plagiarism

Plagiarism is a serious topic covered in ASU's [Academic Integrity policy](#)<sup>7</sup> in the Student Handbook. Plagiarism is the action or practice of taking someone else's work, idea, etc., and passing it off as one's own. Plagiarism is literary theft.

In your discussions and/or your papers, it is unacceptable to copy word-for-word without quotation marks and the source of the quotation. It is expected that you will summarize or paraphrase ideas giving appropriate credit to the source both in the body of your paper and the reference list.

Papers are subject to be evaluated for originality. Resources to help you understand this policy better are available at the [ASU Writing Center](#).<sup>8</sup>

### **Student Absence for Observance of Religious Holy Days**

A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See ASU Operating Policy 10.19 [Student Absence for Observance of Religious Holy Day](#)<sup>9</sup> for more information.

### **Title IX at Angelo State University**

Angelo State University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from sex discrimination of any kind. In accordance with Title VII, Title IX, the Violence Against Women Act (VAWA), the Campus Sexual Violence Elimination Act (SaVE), and other federal and state laws, the University prohibits discrimination based on sex, which includes pregnancy, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination and unwelcome behavior of a sexual nature. The term includes sexual harassment, nonconsensual sexual contact, nonconsensual sexual intercourse, sexual assault, sexual exploitation, stalking, public indecency, interpersonal violence (domestic violence or dating violence), sexual violence, and any other misconduct based on sex.

You are encouraged to report any incidents involving sexual misconduct to the Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator, Michelle Miller, J.D. You may submit reports in the following manner:

Online: [Incident Reporting Form](#)<sup>10</sup>

Face to Face: Mayer Administration Building, Room 210

Phone: 325-942-2022

Email: [michelle.miller@angelo.edu](mailto:michelle.miller@angelo.edu)

Note, as a faculty member at Angelo State, I am a mandatory reporter and must report incidents involving sexual misconduct to the Title IX Coordinator. Should you wish to speak to someone in confidence about an issue, you may contact the University Counseling Center (325-942-2371), the 24-Hour Crisis Helpline (325-486-6345), or the University Health Clinic (325-942-2171).

For more information about resources related to sexual misconduct, Title IX, or Angelo State's policy please visit the [Title IX website](#).<sup>11</sup>

### **Information About COVID-19**

Please refer to ASU's [COVID-19 \(Coronavirus\) Updates](#)<sup>12</sup> web page for current information about campus guidelines and safety standards as they relate to the COVID-19 pandemic.

## Modifications to the Syllabus

This syllabus, including grade evaluation and course schedule, is subject to modification on potentially short notice based on developing circumstances.

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<sup>1</sup> <https://blackboard.angelo.edu/>

<sup>2</sup> <https://www.angelo.edu/current-students/student-handbook/>

<sup>3</sup> <https://www.angelo.edu/academics/catalog/>

<sup>4</sup> <https://www.angelo.edu/live/files/27603-student-handbook-2020-21#page=96>

<sup>5</sup> <https://www.angelo.edu/current-students/disability-services/>

<sup>6</sup> <https://www.angelo.edu/content/files/14197-op-1011-grading-procedures>

<sup>7</sup> <https://www.angelo.edu/live/files/27603-student-handbook-2020-21#page=96>

<sup>8</sup> [https://www.angelo.edu/current-students/writing-center/academic\\_honesty.php](https://www.angelo.edu/current-students/writing-center/academic_honesty.php)

<sup>9</sup> <https://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of>

<sup>10</sup> <https://www.angelo.edu/incident-form>

<sup>11</sup> <https://www.angelo.edu/title-ix>

<sup>12</sup> <https://www.angelo.edu/covid-19/>